

An Evaluation of Shoshone Sculpin (Cottus greeniei) Populations
on the Ritter Estate, Gooding County, Idaho

Report to The Nature Conservancy
Idaho State' Office

by

J. S. Griffith
Department of Biological Sciences
Idaho State University
Pocatello, Idaho

September, 1986

Sampling was conducted in 1984 and 1986 to estimate population size of fish in portions of the Ritter Estate recently acquired by The Nature Conservancy. Emphasis was placed on the Shoshone sculpin, Cottus greenei.

Four study sites were sampled, all in Section 17, T. 8 S., R. 14 E. (Figure 1). Sites A, B, and D were sampled on 15-16 August 1986 and site C was sampled on 8 July 1984.

We used a 1 m x 1 m x 1 m weighted frame to sample for density estimates as described by Daley et al. 1982. This frame was enclosed with fine mesh netting on four sides, but had an open top and bottom. We mapped each study site and stratified each site by habitat characteristics. Within each stratum we randomly chose 1 m² plots for sampling. Immediately after the frame was put in place, a current of 250 volt.DC from a backpack electroshocker was applied to the area enclosed. The shocker was then removed and the substrate and vegetation within the frame were visually inspected for sculpin.

All sculpin collected were measured to the nearest millimeter (total length). Fish were grouped into three size/age categories: fish < 15 mm, which were judged to be under young-of-the-year; fish 15-30 mm, which were judged to be yearlings; and those > 30 mm, which were referred to as adults.

Site A

Site A was the southernmost spring pond on the Ritter property, lying at the base of a talus slope. It was fringed by emergent rush (Scirpus sp.) on the west side (Figure 2). Water was entering the head of the spring pond from two separate sources. Clear spring water (15°C at midday) was seeping through the base of the talus slope. Irrigation return flow (17°C midday) was pouring off the canyon rim and entering the head of the

OF THE INTERIOR CAL SURVEY

GLENNS FERRY 36 MI.
HAGERMAN 5.9 MI.

Figure 1. Location of sites sampled for
Shoshone sculpin in 1984-86.

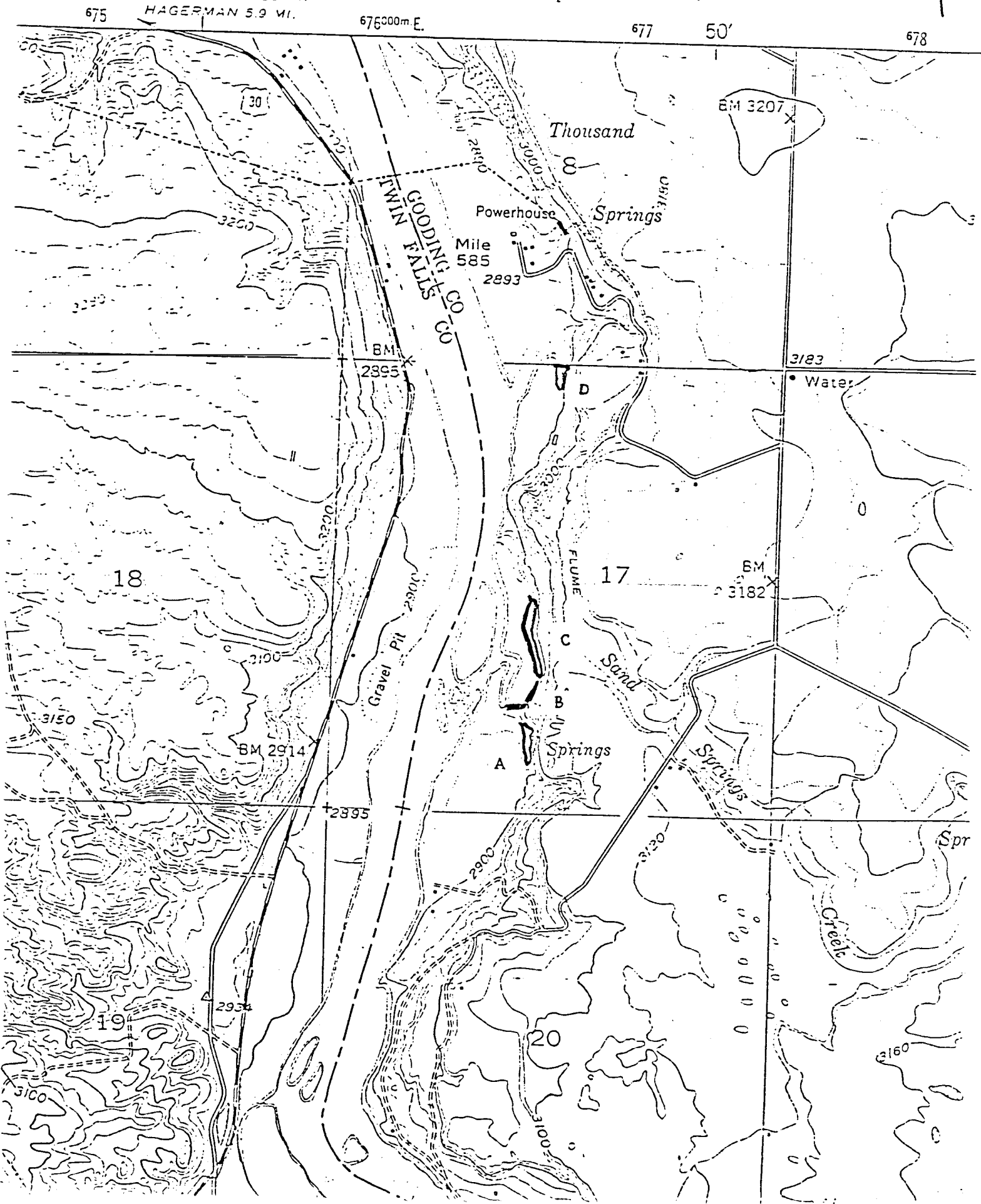
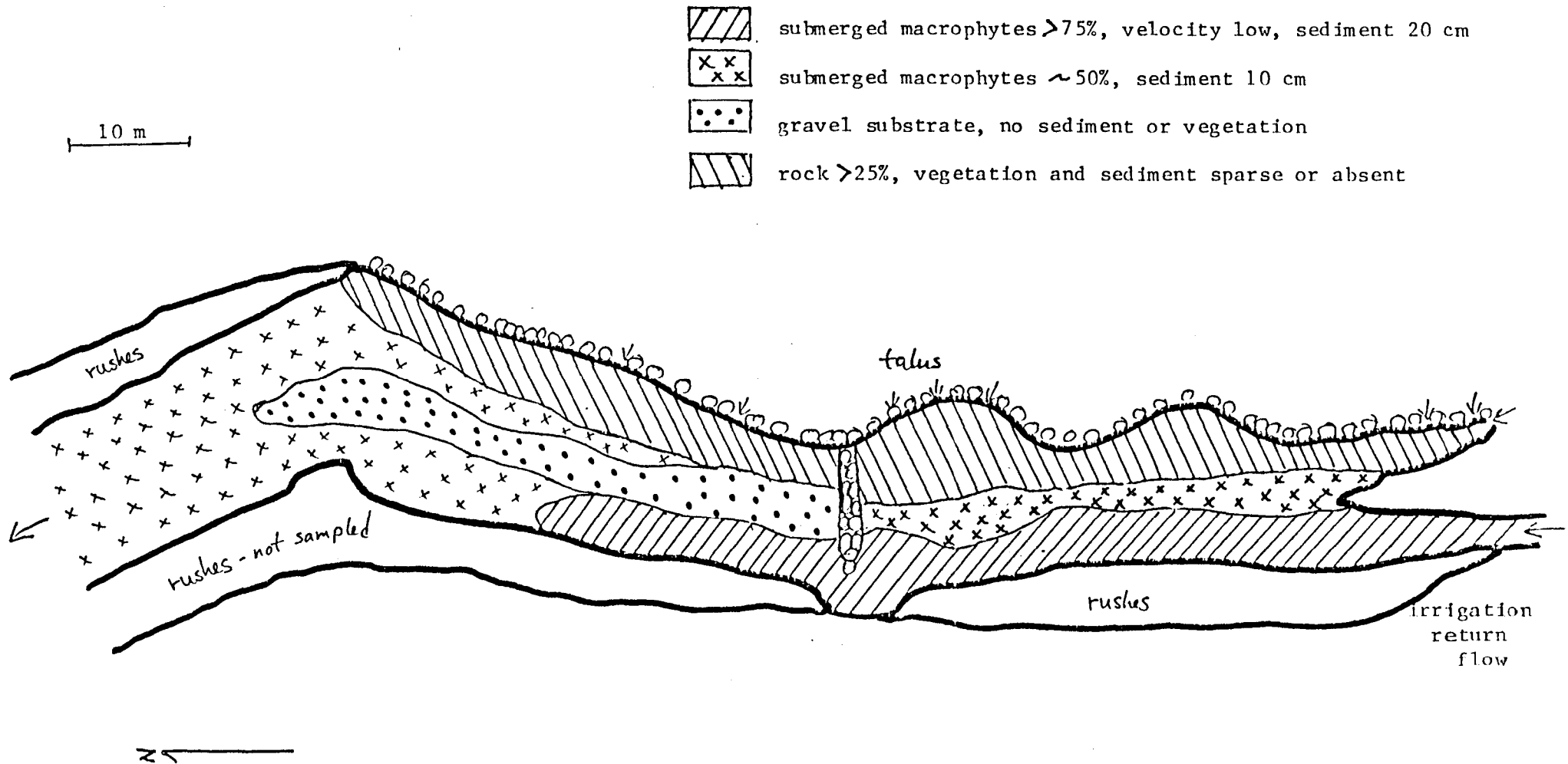


Figure 2. Study site A, Ritter Estate.



pond immediate _ west of the spring source. We sampled 1,560 m² at the head of the pond. Some Shoshone sculpin probably utilized the downstream portion of the pond, but at lower densities.

In addition to Shoshone sculpin, the following species of fish were present:

- rainbow trout (Salmo gairdneri) juveniles
- speckled dace (Rhinichthys osculus)
- redside shiner Richardsonius balteatus)
- mottled sculpin (C. bairdi).

A few large mottled sculpin were found under rubble in the size, but their numbers appeared to be very low.

A total of 17 frame samples were taken to sample the four habitat strata present. Shoshone sculpin densities of all sizes combined ranged from 1.3 to 11.8 fish per m²' (Table 1). Highest densities were found in areas where submerged macrophyte vegetation was highest in the area influenced by the irrigation return flow along the west side of the pond. Lowest densities of Shoshone sculpin were found along the base of the talus slope. From our experience with other Shoshone sculpin populations, we would expect this area to provide good physical habitat. Perhaps this low density of sculpin reflects suboptimal water quality (i.e., low dissolved oxygen). Overall densities of Shoshone sculpin in study site A (6.8 fish per m²) are intermediate in the range of densities found in other populations (Wallace et al. 1982). The total estimated number present in Site A approximates 11,000 fish.

Site B

Site B was a 2 m wide channel extending from the talus slope near the head of Site C approximately 150 m to the lowermost portion of the stream draining Site A. The only other species present was speckled dace.

We sampled the upper 65 m portion of the channel using 7 frames.

Table 1. Numbers of Shoshone sculpin collected in 1-m² frame nets at study site A on the Ritter Estate, 15 August 1986.

Habitat	Number of frames	Area, m ²	Numbers of Shoshone sculpin/m ²			Estimated number	
			young of year	yearling	adult	total	present
submerged macrophytes (mostly Potamogeton) >75%, water veloc. low, sediment 20 cm deep	4	360	4.3	5.0	2.5	11.8	4,250
submerged macrophytes (mostly <u>Veronica</u>) ~ 50% .,sediment 10 cm	6	630	0	5.2	2.8	8.0	5,050
gravel substrate, no sediment or vegetation	3	170	1.0	2.7	1.3	5.0	850
rock >25%, vegetation and sediment sparse or absent	4	400	0	1.0	0.3	1.3 ^a	520
Total	17	1560	1.2	3.7	1.9	6.8	~.11,000

^a
plus one Cottus bairdi

Table 2. Numbers of Shoshone sculpin collected in 1-m² frame nets at study site B on the Ritter Estate, 16 August 1986.

Habitat	Number of frames	Area,	Numbers of Shoshone_ sculpin/m ²			total	Estimated number present
			young of year	yearling	adult		
sand/gravel, sediment depth 0-15 cm	7	130	0	0.6	2.1	2.7	~'350

Density of fish was very low in 1986 (Table 2). At that time, an estimated total of 350 fish were present in the area sampled. This population had declined drastically from July 1984 when a few preliminary samples were made. At that time Shoshone sculpin densities exceeded 12 fish per m². The change in habitat conditions responsible for such a decline should be investigated. It appears that flow through the channel varies drastically and should be stabilized.

Site C

Site C lies directly north of Site A and is considerably larger. It is bordered by talus slope on the west side and a band of Scirpus on the northeast. Other fish species present were mottled sculpin, juvenile rainbow trout, and redbside shiners. Water temperature was 15°C midday.

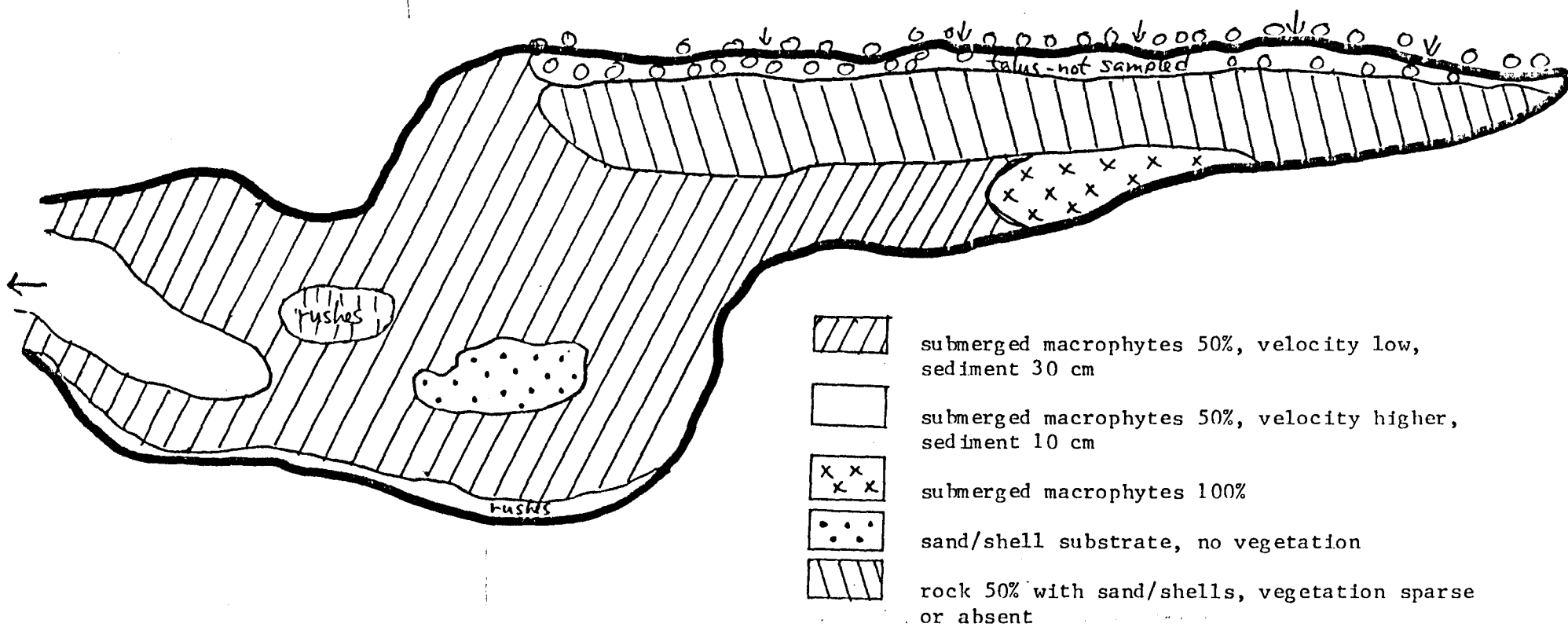
We sampled an area 6,100 m² in size. Five habitat strata were present (Figure 3), and were sampled by 28 frame counts. Shoshone sculpin densities of all sizes combined were fairly consistent, ranging from 6.8 to 10.8 fish per m² (Table 3). As with Site A, highest densities were found where submerged macrophytes were the most abundant. In contrast to Site A, substantial number of sculpin (C. greenei) were three times as abundant as C. bairdi) were found in water at the base of the talus slope, although frame counts could not be made. Overall densities of Shoshone sculpin are at the high end in relation to densities found in other populations. The total estimated number present in Site C approximates 45,000 fish.

Site D

Site D was a small cove of the large channel downstream from the Thousand Springs powerhouse. An inflow of water at the southwest corner has deposited a large amount of sediment. Rubble along the southeast side of the cove provided habitat that held good number of sculpin but could not

Figure 3. Study site C, Ritter Estate.

20 m



25

Table 3. Numbers of Shoshone sculpin collected in 1-m² frame nets at study site C on the Ritter Estate, 8 July 1984.

Habitat	Number of frames	Area, m ²	Numbers of Shoshone sculpin/m ²				Estimated numbers present
			young of year	yearling	adult	total	
submerged macrophytes 50%, low water velocity, sediment 30 cm deep	8	3630	2.2	4.3	0.8	7.3	26,500
submerged macrophytes 50%, higher velocity, sediment 10 cm	5	320	2.4	7.6	0.2	10.2	3,260
submerged macrophytes 100%	5	210	0	10.2	0.6	10.8	2,270
sand/shell substrate, no vegetation	5	180	0.8	5.4	0.6	6.8	1,220
rock 50% with sand/shells, 5 vegetation sparse or absent	5	1760	1.6	5.0	2.0	8.6	15,140
Total	28	6,100	1.5	6.3	0.8	8.6	~49,000

be sampled. Other fish species present were speckled dace, redbreasted shiners, juvenile rainbow trout, and mottled sculpin.

We sampled the entire area (2,410 m²) within the property fence line. A total of 10 frame samples were taken to sample the two habitat strata present (Figure 4). Shoshone sculpin densities of all sizes combined ranged from 9.8 to 11.3 per m² (Table 4), reflecting high densities, especially of adult fish. The estimated total number present in Site D approximates 26,000 fish.

Few large adult C. greeniei longer than 45 mm were found at any site. The largest individual was 83 mm found at Site A.

Figure 4. Study site D, Ritter Estate.

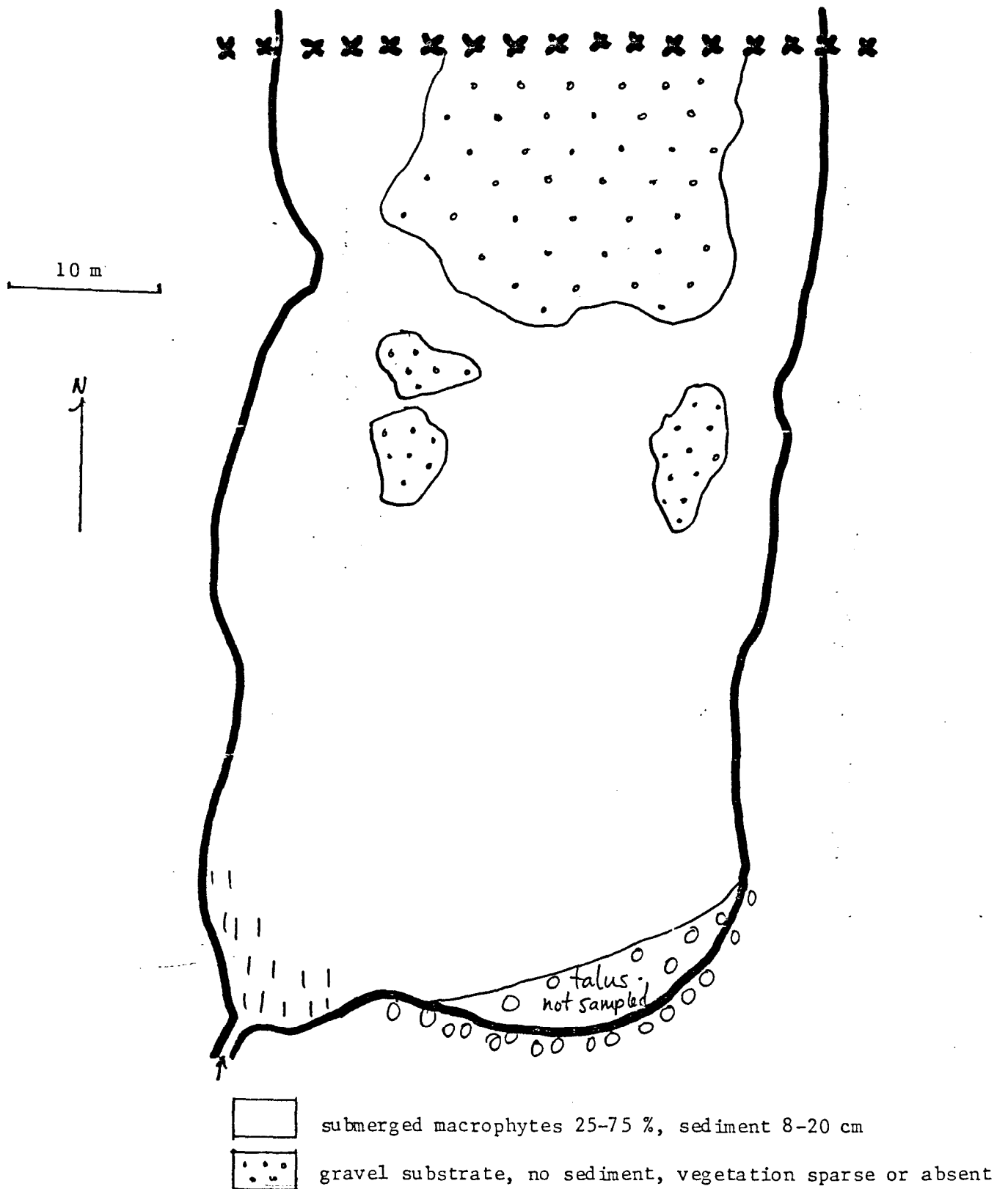


Table 4. Numbers of Shoshone sculpin collected in 1-m² frame nets at study site non the Ritter Estate, 16 August 1986.

Habitat	Number of frames	Area, m ²	Numbers of young of year	Shoshone yearling	sculpin/m ² adult	total	Estimated number present
submerged macrophytes (Chara, Elodea & Veronica) 25-75%., sediment 8-20 cm	6	1950	1.8	2.8	6.7	11.3 ^a	22,000
gravel substrate, no sediment, vegetation sparse or absent	4	460	0.3	1.3	8.3	9.8 ¹⁾	4,500
total	10	2410	1.2	2.2	7.3	10.7	26,000

^a plus one Cottus bairdi

^b plus two C. bairdi

Literature Cited

- Daley, D. M., J. S. Griffith, R. L. Wallace, P. J. Connolly. 1932.
Relative abundance and habitat preference of the Shoshone sculpin
(Cottus sraenei). Proc. Ann. Conf. West. Assoc. Fish and Wildlife
Agencies, pp. 601-610.
- Wallace, R. L., J. S. Griffith, P. J. Connolly, D. M. Daley, and G. B.
Beckham. 1982. Distribution, relative abundance, life history and
habitat preferences of Shoshone sculpin. Final Report to U.S. Fish
and Wildlife Service, Boise, Idaho. 35p.